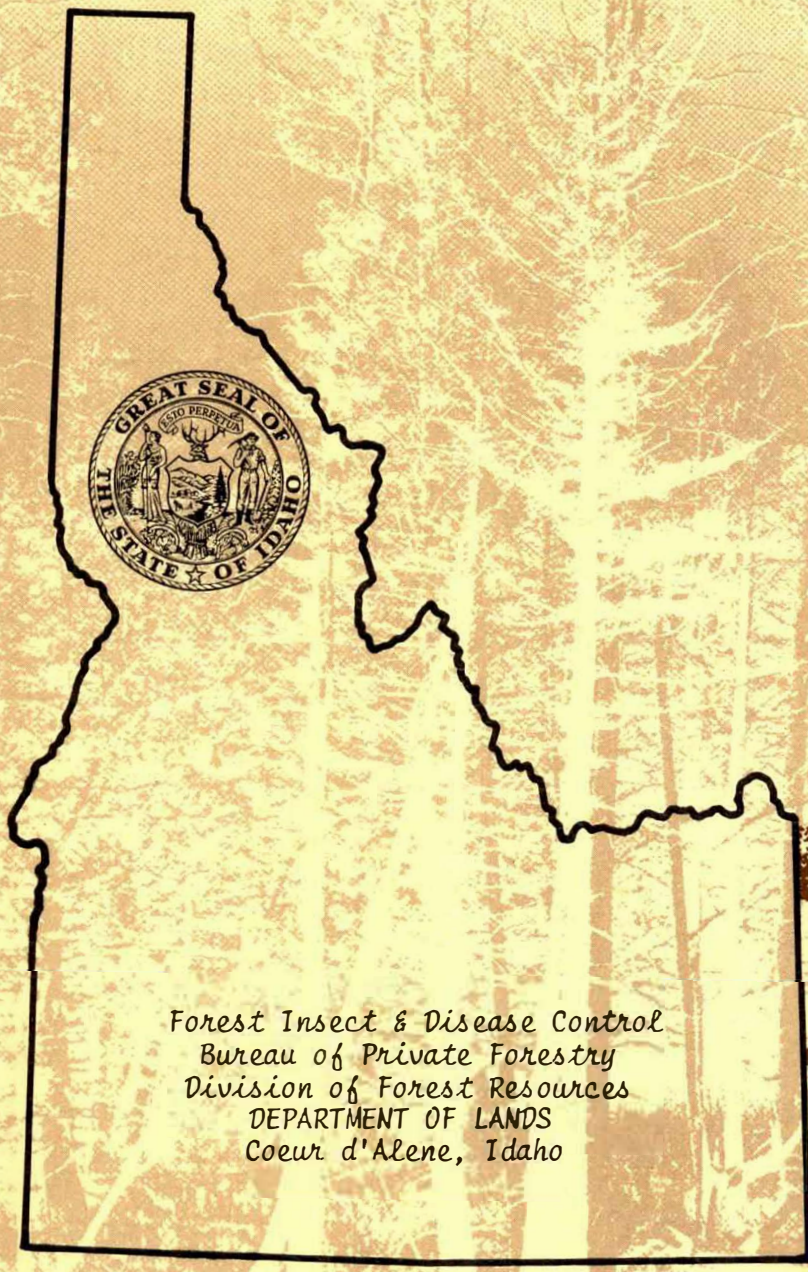
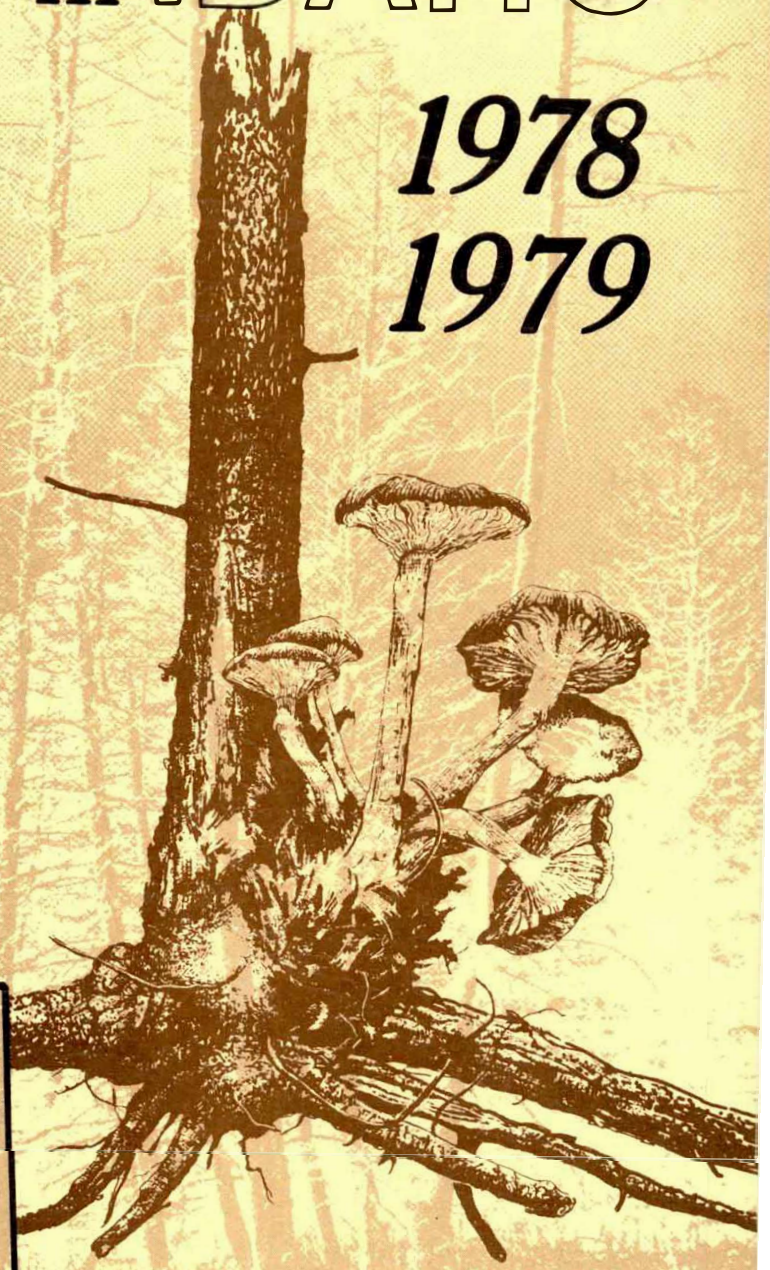
FOREST INSECT and DISEASE CONDITIONS in IDAHO

1978
1979





Forest Insect & Disease Control
Bureau of Private Forestry
Division of Forest Resources
DEPARTMENT OF LANDS
Coeur d'Alene, Idaho

FOREST INSECT AND DISEASE CONDITIONS IN IDAHO

1978
1979

by

R. Ladd Livingston
John Schwandt
David Beckman

Idaho Department of Lands
Forest Insect and Disease Control
P. O. Box 670
Coeur d'Alene, Idaho 83814

Report 80-1
February 1980

TABLE OF CONTENTS

	Page
LIST OF TABLES	iii
INTRODUCTION	iv
INSECT CONDITIONS	
BARK BEETLES	
Douglas-fir Beetle	1
Western Pine Beetle	2
Pine Engraver Beetles	2
Mountain Pine Beetle	4
Fir Engraver Beetle	5
MAJOR DEFOLIATORS	
Western Spruce Budworm	6
Douglas-fir Tussock Moth	8
Larch Casebearer	8
OTHER INSECTS	
Larch Looper	9
Gypsy Moth	9
Pine Butterfly	10
Western Pine Shoot Borer	10
Pine Sawyer Beetle	10
Pityogenes carinulatus (LeConte)	11

Page

DISEASE CONDITIONS

ROOT ROTS 11

NEEDLE CASTS

Winter Kill 12

Greybeard Needle Cast of Ponderosa Pine 12

Larch Needle Cast 13

Lodgepole Pine Needle Cast 13

DWARF MISTLETOES 13

RUSTS

White Pine Blister Rust 14

Western Gall Rust 14

DECAYS 14

OTHER DISEASES

Sycamore Anthracnose 15

Elytroderma Needle Cast 15

Subalpine Fir Needle Cast 16

Yellow Witches Broom (Fir Broom Rust) 16

Dutch Elm Disease 17

HAZARD TREE SURVEYS 17

LIST OF PUBLICATIONS 19

SUMMARIES OF INFESTED ACRES AND/OR TREES BY STATE FOREST PROTECTIVE DISTRICTS 20 thru 27

MAPS - 1978, 1979 Appendix

LIST OF TABLES

		Page
TABLE I	Douglas-fir beetle attacks, 1979	1
TABLE II	Pine engraver attacks, 1978	3
TABLE III	Pine engraver attacks, 1979	3
TABLE IV	Mountain pine beetle attacks, 1978 & 1979	5
TABLE V	Fir engraver attacks	6
TABLE VI	Western spruce bedworm defoliation	7
TABLE VII	Tentative control results, 1979 western spruce budworm control project - Cascade, Idaho	7
TABLE VIII	Douglas-fir tussock moth pheromone trapping results	8
TABLE IX	Number of hazardous trees and associated defects in five Idaho state parks	18

INTRODUCTION

As declared in the *Idaho Code* (Section 38 - 601-603), and through provisions of the United States Cooperative Forestry Assistance Act of 1978, it is the policy of the state of Idaho to protect and preserve forest resources, watersheds and recreational values of Idaho forests from the ravages of destructive forest insect and disease pests. In meeting this responsibility, the Idaho Department of Lands conducts annual aerial and ground surveys to detect forest insect and disease outbreaks or problems. The results of these surveys for 1978 and 1979 are summarized for distribution in this report.

Due to the difficulty of making accurate estimates of the number of trees killed while flying aerial surveys (90-120 mph, 500-2000 ft), these values should not be taken to be an exact measurement of the damage that has occurred. Comparison of aerial survey data with ground check plots has shown that the estimates of number of trees killed are consistently low. However, the location and trends of insect damage from one year to the next can be accurately shown by the maps and by comparing this year's counts with last year's.

The narrative portion covers mainly those pest conditions on or near state and/or private forested lands. The maps at the end of the report, however, show the major problem areas for all ownerships. The green portion is national forest land, the white is state, private and other federal with major blocks of state ownership outlined with a heavy dark line. We have included this additional information as we feel there is a need to show conditions for the entire state so that those interested can find it in one source.

Included in this report are discussions of forest insect projects being conducted in cooperation with the U. S. Forest Service. Through cooperation with the U. S. Forest Service, Region I; Forest Insect and Disease Management; Missoula, Montana; we are presenting summaries of the infested acres and/or trees, with an estimate of volume affected, for each of the major forest pests being reported. This has been compiled for four years for the state and privately owned land in each of the state forest protective districts of northern Idaho. While there are voids in data base, we anticipate that this methodology will allow us to make better comparisons of trends and losses throughout the state.

INSECT CONDITIONS

BARK BEETLES

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae*, Hopkins

From 1978 to 1979 Douglas-fir bark beetle-caused mortality has decreased drastically, especially on state and private lands (Table I). In 1978 we showed eight areas of state and private lands with concentrations of mortality and 23 areas on federal lands (1978 Appendix maps). The damages on state and private lands in 1978 amounted to 2,216 trees with a volume estimate of 886,400 fbm in northern Idaho and 1,176 trees with a volume estimate of 393,960 fbm in southeastern Idaho.

In 1979 in the same areas we did not find any concentrations of Douglas-fir mortality on state and private lands and only 11 groups were seen on federal land (1979 Appendix maps). The scattered mortality on state and private totaled 702 trees (280,800 fbm) in northern Idaho and 183 trees (61,305 fbm) in southeastern Idaho.

In southwestern Idaho the extensive outbreak on federal lands still continues to cause the death of thousands of Douglas-fir trees with the Boise National Forest suffering the heaviest damage in 1979. Very few trees have been killed on state or private lands.

TABLE I

DOUGLAS-FIR BEETLE ATTACKS, 1979

Map Designation	No. Dead Trees	Ownership
A	250	USFS
B	700	"
C	3,000	"
D	225	"
E	200	"
F	505	"
G	150	"
H	780	"
I	815	"
J	4,745	"
K	4,000	"
Total	15,370	
	+ 885	Dead trees on state and private lands
State Total	16,255	

Estimated volume affected 6,502,000 fbm

In a cooperative project with the U. S. Forest Service, Intermountain Forest and Range Experiment Station, we participated in a field test using a repellent pheromone to deter the Douglas-fir beetle from attacking felled trees. The intent is to develop a method of preventing attacks in natural problem areas. By preventing population buildup in windthrow we will be able to reduce subsequent attacks to standing trees. The project was very successful and plans have now been made to conduct a pilot project in the near future.

Douglas-fir bark beetle, stand hazard rating. Work that has taken place over the past few years has produced the following information relative to the Douglas-fir bark beetle and stand susceptibility in northern Idaho (Furniss and others 1979).

Disturbances such as wind storms and fire contribute to increased beetle populations. When such disturbances cease, beetles seek out and attack live trees; their success depends upon the susceptibility of the attacked trees. Trees damaged by snow breakage, possibly those weakened by defoliating insects, stressed by drought, or infected with root rots are susceptible and can contribute to furtherance of the outbreak.

The major conditions positively correlated with increased susceptibility are the proportion of Douglas-fir in a stand, the density and age of the trees. In other words, the larger and older the trees, the denser the stand and the purer it is to Douglas-fir, the more likely it will be attacked by the beetle. By changing these factors through stand management practices the manager can decrease susceptibility and the chances of suffering losses.

WESTERN PINE BEETLE, *Dendroctonus brevicomis*, LeConte

Activity of this beetle continues to be very low throughout northern Idaho on state and private lands. In 1978 100 trees were recorded as being attacked by this beetle, and in 1979 95 were found. This was in spite of the dry summers we have had.

In southern Idaho the situation was the same with about 300 attacked trees scattered within the national forest in 1978 and no attacks recorded in 1979.

PINE ENGRAVER BEETLES, *Ips pini*, (Say)

The effect of the drought in 1977 has carried through to 1978 but apparently declined in 1979. In 1978 the total of dead trees counted on state and private lands in northern Idaho were 23,316; in 1979 for the same area the total was 2,566. In southwestern Idaho the 1978 totals were 5,385 dead trees on state and private lands and 8,545 on federal ownership. For 1979 the figures are 6,000 dead trees on state and private lands with no concentrations of *Ips* activity recorded on federal lands. Tables II and III list the areas of concentrated beetle activity designated on the maps and show the total number of trees killed, by ownership, in each area. There are also many other scattered dead tree groups throughout the host type between the mapped areas.

TABLE II

PINE ENGRAVER ATTACKS, 1978

Map Designation	Dead Trees by Ownership		Map Designation	Dead Trees by Ownership	
	State & Private	Federal		State & Private	Federal
1	13,475	1,200	16	670	
2	2,072		17	820	
3	2,319		18	290	40
4	2,062		19	150	100
5	3,680		20	405	
6	360		21	570	60
7	1,625		22		165
8	370		23		185
9	295		24		1,065
10	1,870		25		415
11	500	70	26		810
12	530	220	27		295
13	100	10	28		2,400
14	1,350	1,285	29		270
15		250	30		290

Total S&P 33,513
Fed. 9,130

42,643

TABLE III

PINE ENGRAVER ATTACKS, 1979

Map Designation	Dead Trees by Ownership	
	State & Private	Federal
1	2,100	
2	200	
3	2,000	
4	1,000	
5	3,000	

Total S&P 8,300

Fed. 0

The *Ips* beetle damage suffered in 1979 is actually higher than what we have recorded, as in at least two areas (the Craig Mountains south of the Salmon River and on the south side of the Spokane River from Coeur d'Alene to the Idaho-Washington state line) we have observed many trees fade during the late summer and early fall.

In 1977 we had many *Ips* attacks that only killed the tops of trees. In 1978 we conducted a survey to determine what beetles might go into the unattacked lower trunk. We were concerned that *Ips pini* might make new attacks in that portion and build up larger populations. We found that many other beetles attacked these trunks, but not the pine engraver. Mainly we found two species of *Hylurgops* (*H. subsoctulatus* and *H. porosus*) and *Ips plastographus*.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae*, Hopkins

In northern Idaho tree mortality attributed to the mountain pine beetle generally is very low. The main exception is in the Soldier's Meadows Reservoir area south of Lewiston where an outbreak has developed in lodgepole pine. The infestation, which is three years old, currently covers portions of approximately six sections. The number of freshly killed trees has increased dramatically from 1977 when we reported 2,650 to 10,210 in 1978 and 10,320 in 1979. The increase in dead trees is actually greater than we show as both Potlatch Corporation (in 1978) and the Idaho Department of Lands (in 1979) have conducted salvage operations on their affected ownerships. Other private landowners are also beginning to harvest mortality and are also getting ahead of the beetles by cutting their green, old growth stands before extensive mortality has taken place. Further population and impact surveys will be conducted in 1980.

In southwestern Idaho, in the Payette and Boise National Forests and adjacent state and private lands, the mountain pine beetle has continued to cause extensive mortality of lodgepole pine with scattered hits in ponderosa pine (Table IV). Significant increases in the number of dead trees have shown up in the Hornet Creek-Johnson Creek Park area and in Clear Creek and the Smith's Ferry-Cabarton area.

In eastern Idaho the severe outbreak which has been in progress for more than 20 years still continues to kill hundreds of thousands of trees. Forest Service entomologists indicated that the beetle is starting to reinfest areas that have not had problems for at least 20 years.

The introductory sentence of a mountain pine beetle narrative in the 1969 U. S. F. S. Region 4 Forest Insect and Conditions Report says, "The past ten years might easily be called the 'decade of the mountain pine beetle' in the Intermountain West." Since then we have had another decade like the first, and now in 1980 there is no indication that the infestation has decreased by any appreciable amount. In that 20 years the stands earliest hit apparently have regrown back to a susceptible condition. It appears that the beetle could be with us indefinitely. The only way to get ahead is to cut the trees green before the beetles kill them.

TABLE IV

MOUNTAIN PINE BEETLE ATTACKS 1978 & 1979

Area	Mapped areas, north to south					
	1978			1979		
	State & Private	Combined	Federal	State & Private	Combined	Federal
Lost Valley Reservoir	670		400			
McCall and Vicinity		16,100			19,780	
Paddy Flats-Flat Cr.		9,000			6,000	
Hornet Cr.-Johnson Cr. Park		6,640			15,000	
Crawford-Scott Valley					2,500	
Clear Creek	600		1,000		10,000	
Herrick Reservoir	Incl. as part of Smith's Ferry			1,150		
Deadwood Reservoir			6,700			7,600
Silver Cr. Campground						2,530
Smith's Ferry-Cabarton	6,100		1,390		14,450	
Packer John Mtn.				110		
N. Fk. Boise River			3,000			
Middle Fk. Boise River (Atlanta)			1,000			
Yearly Totals		52,600			79,120	

FIR ENGRAVER BEETLE, *Scolytus ventralis*, LeConte

Fir engraver beetle activity is currently at low levels throughout northern Idaho. The 1978 infestation had twice as many dead trees as we saw in 1979 (Table V). Generally in 1979 the fir engraver attacks were widely scattered and evenly distributed throughout the host type. Few dead-tree groups had more than 10 trees in them. According to some biologists, the scattered nature of the attacked hosts indicates a general susceptibility of the stand and that next year in 1980 we will very likely see an increase in the amount of killed trees.

TABLE V

FIR ENGRAVER ATTACKS

1978		1979	
Map Designation	Total Number Dead Trees	Map Designation	Total Number Dead Trees
1	100	1	350
2	350	2	350
3	1,000	3	6,000
4	8,500		
5	1,025	Total	6,700
6	350		
7	350		
8	640		
9	1,300		
Total	13,615		

In a study completed in 1979 we found that the presence of grand fir thinning slash attracted the fir engraver beetle which made unsuccessful attacks on leave trees. These aborted attacks callous-over and make scars which remain visible on the trunks for up to 10 years afterwards. The dead tissue which results from the attack increases the chances of ring shake, discoloration and rot. Our publication 79-2 described this study and gives management recommendations.

MAJOR DEFOLIATORS

WESTERN SPRUCE BUDWORM, *Choristoneura occidentalis*, Freeman

In northern Idaho the budworm epidemic has declined to the extent that no defoliation was mapped in 1979. In southern Idaho the infestation has continued in outbreak proportions through 1978 and increased overall in 1979. In southwest Idaho the infestation on the Boise and Payette National Forests and adjacent state and private lands has remained at approximately the same acreage overall but there have been decreases on the Payette National Forest and increases on the Boise National Forest (Table VI). This trend is expected to continue in the future with the population declining on the Payette National Forest where it is oldest, and increasing on portions of the Boise National Forest where the infestation is the youngest or developing in areas where it is not noticeable at the moment.

In eastern Idaho the budworm infestation has increased on the Salmon and Targhee National Forests and on adjacent state and private lands (Table VI). We surveyed one infestation that covers 12,100 acres of state, private and Bureau of Land Management ownership in the Blackfoot Mountains southeast of Idaho Falls. An egg mass survey for this area indicates the population will at least maintain itself and probably increase in 1980.

TABLE VI

WESTERN SPRUCE BUDWORM DEFOLIATION

National Forest*	Light Defoliation	Medium Defoliation	Heavy Defoliation	1979 Total	1978 Total	Difference
Boise	44,747	36,121	66,533	147,401	228,000	+ 59,401
Payette	46,425	52,939	176,151	275,515	308,900	- 33,385
Salmon	91,827	99,788	152,957	344,572	183,000	+161,572
Targhee	38,862	79,072	88,752	206,686	105,800	+100,886
Blackfoot Mtns.		12,100		12,100		
TOTALS	221,861	280,020	484,393	986,274**	825,700	+160,574

*Includes adjacent state and private lands.
**Does not include 140,000 acres of 1979 budworm control project.

In 1979 we conducted a chemical control project against the budworm on state and private lands in the Cascade, Idaho area. Two pesticides were used over a total of approximately 140,000 acres. Table VII shows the tentative control results. A project report is being prepared which will provide greater detail of the work.

TABLE VII

TENTATIVE CONTROL RESULTS
1979 Western Spruce Budworm Control Project - Cascade, Idaho

Area	Treatment	% Population Reduction*	Corrected for Natural Mortality
Paddy Flats	Orthene**	88.7%	81.9%
Flat Creek	Orthene	86.4%	77.9%
Packer John	Sevin***	96.4%	94.1%
Smith's Ferry	Sevin	96.5%	94.3%
West Mtn.-Gold F.	Check	38.5%	

*Prespray population compared to postspray population.
**Orthene applied at ½ lb active ingredient in one gallon of water.
***Sevin applied at 1 lb active ingredient in ½ gallon of diesel.

DOUGLAS-FIR TUSSOCK MOTH, *Orgyia pseudotsugata*, McDunnough

The Douglas-fir tussock moth has continued at very low levels. Pheromone trapping at 12 sites caught one moth in 1978 and 18 in 1979 (Table VIII). We do not consider that this increase in catch constitutes any immediate threat of an outbreak.

TABLE VIII

DOUGLAS-FIR TUSSOCK MOTH

Pheromone Trapping Results

	Moths Caught		
		1979	
Plot Location	1978	Survey traps	Detection trap*
Elk Mountain	0	0	15
Coeur d'Alene Mountain	0	1	12
Lolo Pass	0	1	52
Charles Butte	0	1	71
Peterson Point	1	0	9
East Gold Hill	0	0	31
Flat Creek	0	3	No trap
Long Creek	0	2	22
Paradise Point	0	0	37
Mineral Mountain	0	6	51
Mission Mountain	0	3	71
TOTAL	1	18	405

*One high pheromone concentration trap placed near the survey traps to verify that moths were present in the area.

In 1980 we will be expanding our pheromone trapping survey to include the cities of Moscow and Coeur d'Alene. During past outbreaks tussock moth caterpillars were found in these cities before they were seen in the forest.

LARCH CASEBEARER, *Coleophora laricella*, (Hubbner)

The larch casebearer continues to cause extensive defoliation in northern Idaho and is becoming more noticeable in southern Idaho where it was first discovered in 1977. The U. S. Forest Service, Forest Insect and Disease Management entomologists from Boise have begun a program to introduce casebearer parasites for control in the Boise and Payette National Forests. They have collected parasite infested casebearers from northern Idaho and Montana for their release program.

While casebearer damage is easily detected in the spring, it is often masked by the work of other defoliating insects or needle diseases later in the year. For two or three years a larch needle cast and a larch sawfly have been causing additional problems. This year we have seen another damaging agent, the larch looper. It was found defoliating nearly 40,000 acres of larch near Colville, Washington. The similarity of those forest stands and their proximity to northern Idaho is a warning that we could also have an outbreak of this insect in the future.

Other Insects

LARCH LOOPER, *Semiothisa* sp.

The larch looper mentioned above is probably *S. sexmaculata incolorata* (Dyar). It differs from other common larch defoliating insects in its feeding habits by completely defoliating the branches and sometimes the entire tree. From a distance the exposed bare branches have a reddish tint to them (Figure 1). As the casebearer and sawflies feed they leave a portion of the needle which dries and fades giving the stand a yellowish appearance.

Figure 1.

Defoliation of larch caused by a larch looper.

GYPSY MOTH, *Lymantria dispar*, (Linnaeus)

We were not able to conduct our usual gypsy moth survey in 1979, but none were found in 1978 and none have been reported from other sources in 1979.

PINE BUTTERFLY, *Neophasia menapia* (Felder & Felder)

Pine butterfly adults have been noticed by many people in the Coeur d'Alene area where we have received several calls of inquiry about them. There have not been any reports from other areas.

WESTERN PINE SHOOT BORER, *Eucosma sonomana* Kearfoll

The western pine shoot borer has been found in all pine plantations of northern Idaho. The damage caused by this insect is mainly reduction of height growth of the leader. Occasionally the leader is killed which may cause a multiple top. In a brief survey of a plantation in the Clearwater Supervisory Area we found that 28% of the evaluated trees were unattacked, 4% had only dead laterals, 64% had nonlethal attacks in the terminal and 4% had attacks that killed the terminal.

Two chemical companies are now seeking EPA registration for a pheromone treatment that will disrupt mating and reduce subsequent damage. This methodology has been tested and found very effective in reducing damage. The Weyerhaeuser Lumber Company is planning on conducting an operational control project using this methodology on 10,000 acres in the spring of 1980.

SAWYER BEETLE, *Monochamus* sp.

A sawyer beetle, presumably *M. scutellatus* (Say) was found heavily infesting lodgepole pine in several log decks in the Coeur d'Alene area (Figure 2). A few attacks were also found in the decked ponderosa pine. The larvae caused severe defect by their boring activity, being found as deep as six inches into the wood. After becoming aware of the problem one mill shifted its cutting priority to process all decked lodgepole and thus prevented further damage. The condition apparently developed as a result of the dry summer, as the loggers reported seeing the boring frass in standing trees that they were felling. There was no fire associated with the area. The problem was not just local as a logging company representative brought in a board sample with the same problem that had come from Montana.

Figure 2.

Piles of boring frass produced by larvae of the sawyer beetle working in a deck of lodgepole pine.

A BARK BEETLE, *Pityogenes carinulatus* (LeConte)

This bark beetle was found infesting ponderosa pine slash that resulted from a thinning approximately 25 miles north of Coeur d'Alene. At first it was confused with the pine engraver and was a cause of concern to the administering foresters. Generally this insect does not pose a threat to standing trees even though the population may build up somewhat in the slash. The beetle has been seen to kill standing trees one time in New Mexico.

DISEASE CONDITIONS

Root Rots

Root rots are presently causing considerable concern because it is so difficult to recognize and quantify their damage. In addition, the presence of insects and diseases interacting as a complex in causing tree mortality makes recognition and treatment difficult since all factors must be considered in sound management prescriptions. To answer some of these concerns, the Forest Service is investigating the effects of root diseases on regeneration in areas of northern Idaho which have been subjected to a variety of harvesting methods. Information gained by this study will be especially helpful in treating root rot infected areas in the Pend Oreille, St. Joe and Clearwater Supervisory Areas. Extensive root disease activity was observed by the Forest Service during a detailed survey in northern Idaho along the upper St. Joe River.

In the Boise National Forest, University of Idaho researchers found a complex of insects and root diseases involved in Douglas-fir mortality centers previously attributed solely to the Douglas-fir bark beetle. Apparently root diseases have been slowly decaying many of the root systems for over 30 years before being invaded by the bark beetles (Partridge and Canfied 1978).

Symptoms which are commonly associated with pockets where root diseases are active include trees in varying stages of decline (recognized by their off-color, thin crowns and stress cone crops) and pockets of windthrow. Close examination of trees in these areas often reveals heavy basal pitch flow, and distinctive patterns of fungal tissue on or under the bark of infected trees as well as conks of the causal agent fruiting nearby (as illustrated on the cover). As foresters become more familiar with these symptoms more centers will continue to be discovered, increasing the demand for additional research and the development of sound management strategies.

NEEDLE CASTS

WINTER KILL

While not a true needle cast disease, the prolonged cold winter last year resulted in dead foliage on many tree species throughout the state. This occurred when the conducting tissues in the trees were frozen so deeply that they were unable to replenish water lost when exposed foliage continued to transpire. The foliage and some small branches on several species were killed. Damage was greatest on southern exposures where sunlight was most direct.

Western white pine and western redcedar were the hardest hit in the Priest Lake Area, while grand fir and western redcedar were affected the most in the St. Joe and Clearwater Areas. Damage was so widespread in the Peterson Corners area six miles east of Weippe that it was readily observable during the aerial surveys. Effects were also seen on Douglas-fir and a variety of ornamental pines and spruces. While little mortality was observed, Christmas tree growers and nurserymen near Sandpoint sustained considerable losses.

GREYBEARD NEEDLE CAST OF PONDEROSA PINE, *Lophodermium* sp.

A large number of ponderosa pine in the Boise National Forest and surrounding areas suffered heavy damage from this needle cast early last summer. All ages of trees were attacked with damage usually being most severe in the lower portion of the crowns. Only one-year-old and older needles were attacked causing them to turn brown, then gray and hang from the branches (Figure 3). Individual tree susceptibility varied greatly although nearly all trees in some drainages of the Crouch area were infected to some degree.

More observations will have to be made to get a better idea of the distribution and impact of this problem.

Figure 3.

Drooping needles symptomatic of greybeard needle cast.

LARCH NEEDLE CAST, *Meria laricis* Vuill.

The larch needle cast/sawfly problems that were so evident in 1977 have not been repeated. A few localized areas of infection were observed near Priest Lake, St. Maries, Clarkia, Bovill, and north of Cascade. Apparently the conditions which were so conducive to the needle cast fungus outbreak in 1977 have not reoccurred.

LODGEPOLE PINE NEEDLE CAST, *Lophodermella concolor* (Dearn.) Darker

The lodgepole pine in the Eastern Idaho Area were extensively infected by this needle cast last spring. In the spring the branches had a burned appearance because all the infected one-year-old needles had turned brown. Infection of this year's needles will not show up until next spring. While little mortality has been reported growth may be reduced, especially in the heavily infected young reproduction.

DWARF MISTLETOES

DWARF MISTLETOE, *Arceuthobium* spp.

Dwarf mistletoe is the number one disease problem in many areas of Idaho. Heavy concentrations of Douglas-fir dwarf mistletoe were observed in several northern Idaho areas this year including a severe pocket in Farragut State Park.

In eastern Idaho over 3,000 acres of lodgepole pine forests in the Island Park area were surveyed from a Bell helicopter cruising at 40-65 mph 100-200 feet above the forest canopy. Witches brooms were readily discerned and could be used to distinguish general levels of infection (high, medium, or low). The low cost (about $.25/acre) and relatively high degree of accuracy indicate this could be a very cost effective survey method especially in remote areas of unknown or widely varying dwarf mistletoe infection levels (Report 78-6). Recent inventory surveys in eastern Idaho indicate over 50% of the lodgepole pine are infected at a medium to high level. This represents an average of over 150 infected trees per acre.

Many forests contain abundant reproduction growing under an overstory of old, decadent, highly infected trees. If the infected species is desired as a viable crop tree, overstory removals must be incorporated into management plans along with sanitation efforts to cleanse young stands before they become hopelessly infected. Guidelines have been designed which incorporate dwarf mistletoe control techniques into normal timber management activities (Schwandt 1977).

RUSTS

WHITE PINE BLISTER RUST, *Cronartium ribicola* J. C. Fisch, ex Rab.

Because of the difficulty in recognizing white pine blister rust during aerial surveys we did not include a distribution map this year. It is apparently well entrenched throughout the range of western white pine and other five-needle pines.

Extensive timber losses are occurring in the Hoodoo Mountain area from St. Maries west to Plummer and south to Harvard, Deary and Bovill, where several thousand acres of mixed ownership are involved. Another broad area of infection is east and north of Priest Lake with scattered pockets of infected trees south along Priest River to the Pend Oreille River in northern Idaho. Additional reports show infections south and west of Elk River, and in a broad area southwest of the North Fork of the Clearwater extending to Gold Creek. Over 15,000 acres of state and private timber lands are affected. This past year it was observed in the Lick Creek Summit area east of McCall causing serious losses of limber pine.

Although concentrated efforts to develop disease resistant nursery stock show some promise, the U. S. Forest Service anticipated that it will be several years before enough stock is available to adequately meet all needs. In the meantime, conscientious efforts should be made to leave apparently disease-free white pine for seed trees in sale areas with high amounts of rust. This alone can greatly enhance the natural selection process by producing as much as 20% more resistant seedlings. A pamphlet ("Selecting Western White Pine Leave-Trees") to aid foresters in selecting the best leave trees is available from the U. S. F. S. Forestry Sciences Laboratory at Moscow, Idaho (Hoff and McDonald 1977).

WESTERN GALL RUST, *Endocronartium harknessii* (J. P. Moore) Y. Hiratsuka

This common rust disease can be found at various levels of intensity throughout the state on lodgepole pine and ponderosa pine. Mortality usually occurs in reproduction, but older trees which have apparently overgrown stem attacks are poorly formed and become highly susceptible to wind breakage. Although in some areas infection levels may be so high that stand conversion to other nonhost species is warranted, in most areas there appears to be enough naturally resistant seedlings so that the gall rust works as a thinning agent, weeding out those trees with low natural resistance.

DECAYS

We continue to be plagued by severe decay losses, especially in older growth and previously logged stands where very little concern was given for the residual trees. The principal causes of losses are decays of cedar by

Phellinus (Poria) weirii (Murr.) Gilb. and *Polyporus sericeomollis* Rom. *(Poria asiatica)*, and hemlock and true firs by *Echinodontium tinctorium* Ell. and Ev. Several other decay fungi may be important factors in localized areas on other conifer species. For example, red ring rot, caused by *Fomes pini* (Brot. ex. Fr.) Karst. is especially common on white pine and larch in the Clearwater, St. Joe and Priest Lake areas. As old growth timber is harvested and more conscientious harvesting practices are utilized to improve the health and selection of residual trees, losses to decays are expected to decline.

However, in some areas second growth trees have large amounts of decay. While this has generated considerable concern, most cases can be traced back to previous logging practices which frequently left the poorest trees, often with logging wounds. As discussed earlier, grand fir have often been heavily attacked by bark beetles after thinning. Even though the attacks were unsuccessful, ring shake and decay have been associated with some of these attacks.

OTHER DISEASES

SYCAMORE ANTHRACNOSE, *Gnomonia platani* Kleb.

The "urban forests" of the Boise area had very high infection levels of sycamore anthracnose last spring. The fungus attacks the foliage as soon as it begins to develop and looks much like frost damage. The high severity of infection was directly related to the cool moist spring weather and a large number of trees were completely defoliated. While damage during June appeared devastating, most trees had a second flush of foliage that completely erased effects by August.

Although the causal fungus overwinters primarily on old foliage, small twigs are also infected so sanitation efforts to remove leaves in the fall may not eliminate the problem.

ELYTRODERMA NEEDLE CAST, *Elytroderma deformans* (Wier) Darker

Elytroderma is the most common and most damaging needle cast on ponderosa pine as this disease becomes perennial and can cause severe growth losses. The brooming effect caused by this fungus has often been confused with dwarf mistletoe, but can usually be identified by the presence of a large number of dead needles trapped in the brooms and the small black lines of fungal tissue on the underside of infected needles. This disease appears to be widespread throughout the host type in northern Idaho but is of greater concern in southern Idaho stands where ponderosa pine is the predominate species.

SUBALPINE FIR NEEDLE CAST, *Lophodermium* sp.

The subalpine fir in the Freezeout Mountain area had high enough infection levels of needle cast to be conspicuous during aerial surveys in 1979. Indistinct yellow and red areas appeared on last year's needles and gradually expanded until the entire needle was killed. Damage was confined to foliage at least one-year-old and was most severe on the lower portion of the crown (Figure 4). A number of the trees have apparently been infected for several years and growth rates on a few trees sampled were depressed. While not a major mortality factor, the needle cast was probably a factor in the death of some trees in the area.

Since intensity levels can be expected to fluctuate with environmental conditions, observations will be made during the next few years to learn more about the possible long term effects of infection.

Figure 4.

Subalpine fir needle cast near Freezeout Mountain.

YELLOW WITCHES BROOM (FIR BROOM RUST), *Melampsorella caryophyllacearum* Schroet.

Compact yellowish witches brooms caused by this rust fungus can be found in grand fir and subalpine fir throughout the state, but are the heaviest in eastern Idaho on subalpine fir. The yellow color is due to the fungus which fruits abundantly on the needles. Although no mortality is apparent, tree growth rates are reduced and heavily infected trees may be predisposed to other deleterious agents.

DUTCH ELM DISEASE, *Ceratocystis ulmi* (Buism.) C. Mor.

Losses continue at a high rate in those cities which have Dutch elm disease but have not initiated any control program. Losses in Boise have been drastically reduced through their integrated program of insect spray and quick sanitation (removal of dead and dying trees).

Hazard Tree Surveys

In response to a request from the Idaho Department of Parks and Recreation, systematic surveys for hazardous trees were conducted in several state parks. All trees that could fall on campsites, picnic sites or park buildings were examined for failure potential and were tested with an increment borer when necessary to determine extent of decay. Each hazard tree was given a high, medium or low risk rating based on: probability of tree failure, suspected direction of fall, probable impact target, and potential damage. Some of the survey findings are summarized in Table IX. While the tree species composition was different in each park, the types of defects were quite similar. Almost all high hazard trees had more than one type of defect with heart rots (decay) occurring most frequently.

Unfortunately some of the most picturesque trees in our parks are the most hazardous. This creates a predicament for park managers since hazard tree removal may be looked upon as reducing park beauty. However, the wide variety of other trees present should help obscure the gradual removal of these large trees. Park personnel were advised to remove all high and medium risk trees as soon as possible to reduce the probability of an accident. In addition, park personnel were given training in hazard tree recognition and survey procedures to assist them in initiating regular inspections.

References Cited

Furniss, M. M., M. D. McGregor, M. W. Foiles and A. D. Partridge. 1979. Chronology and characteristics of a Douglas-fir beetle outbreak in northern Idaho. USDA For. Serv. Gen. Tech. Rep. INT-59, 19 pp. Intermt. For. and Range Exp. Sta., Ogden, Utah.

Hoff, R. J. and G. I. McDonald. 1977. Selecting western white pine leave trees. USDA Forest Service Research Note INT-218.

Partridge, A. D. and E. R. Canfield. 1978. Mortality of Douglas-fir in the Boise National Forest. University of Idaho, College of Forestry, Wildlife and Range Sciences. 9 pp.

Schwandt, J. 1977. Dwarf mistletoe control guidelines for Idaho forests. Bureau of Private Forestry, Department of Lands, Coeur d'Alene, Idaho. 13 pp.

TABLE IX

NUMBER OF HAZARDOUS TREES AND ASSOCIATED DEFECTS
IN FIVE IDAHO STATE PARKS

	STATE PARK					
	Priest Lk.	Heyburn	Round Lk.	Winchester	Farragut	Total
RISK						
High	10	16	12	18	5	61
Medium	32	33	30	10	10	115
Low	27	6	4	15	40	92
Total	69	55	46	43	55	268
TREE SPECIES						
Grand fir	5	9	13	30	3	60
Douglas-fir	--	4	7	9	5	25
Larch	6	23	11	--	4	44
Ponderosa	--	19	--	1	18	38
Lodgepole	8	--	13	--	25	46
Cedar	12	--	1	--	--	13
Hemlock	29	--	--	--	--	29
Others	9	--	1	3	--	13
Total	69	55	46	43	55	268
DEFECTS						
Decay	20	31	42	30	5	128
Wounds	16	12	13	10	18	69
Root Rot	5	9	5	2	5	26
Leaning	14	18	7	8	5	52
Cankers	5	21	3	2	12	43
Basal Cav.	5	10	3	13	3	34
Dead	27	6	1	1	20	55
Other	2	--	3	4	2	11
Ave. #/Tree	1.4	2.0	1.7	1.6	1.3	

LIST OF PUBLICATIONS

1978

1. Forest insect and disease conditions in Idaho, 1977. R. Ladd Livingston, John Schwandt, David Beckman. 78-1, 24 pp.

2. Priest Lake State Park hazard tree inspection, May 1978. John Schwandt. 78-2, 4 pp.

3. Forest products and utilization directory for Idaho. August 1978. Rex Johnson. 78-3, 39 pp.

4. Survey for hazardous trees in Winchester State Park, Idaho. August 1978. John Schwandt. 78-4, 12 pp.

5. Small roundwood products in Idaho. August 1978. Rex Johnson. 78-5, 24 pp.

6. Surveying Idaho forests for dwarf mistletoe by helicopter. September 1978. John Schwandt and Dennis Page. 78-6, 7 pp.

7. Sheep Springs ponderosa pine thinning: bark beetle evaluation, Pend Oreille Supervisory Area. October 1978. R. Ladd Livingston and David Beckman. 78-7, 5 pp.

8. Balsam woolly aphid: report of Oregon infestation and considerations for Idaho. November 1978. R. Ladd Livingston. 78-8, 9 pp.

9. How valuable are your ornamental and shade trees? November 1978. John Schwandt. 78-9, 5 pp.

1979

1. Survey for hazard trees in Heyburn State Park, Idaho. April 1979. John Schwandt. 79-1, 11 pp.

2. Fir engraver - grand fir thinning impact study, Clearwater Supervisory Area. October 1979. R. Ladd Livingston, David Beckman, Mark Weadick. 79-2, 14 pp.

3. The pine engraver beetle in Idaho, life history, habits and management recommendations. November 1979. R. Ladd Livingston. 79-3, 8 pp.

4. Survey for hazardous trees in Round Lake State Park, Idaho. December 1979. John Schwandt. 79-4, 10 pp.

5. Evaluation of the western spruce budworm infestation in the Blackfoot Hills, Eastern Idaho Supervisory Area. December 1979. R. Ladd Livingston and David Beckman. 79-5, 7 pp.

6. The western pine shoot borer, *Eucosma sonomana* in ponderosa pine reproduction, Lolo Breaks Timber Sale, Clearwater Supervisory Area. December 1979. R. Ladd Livingston and John Schwandt. 79-6, 9 pp.

SUMMARY OF INFESTED ACRES AND/OR TREES
BY STATE FOREST PROTECTIVE DISTRICT

FIR ENGRAVER

DISTRICT	ACRES				TREES				VOLUME (fbm)			
	1976	1977	1978	1979	1976	1977	1978	1979	1976	1977	1978	1979
Priest Lake					9	7	12	175		2,100	960	52,500
Pend Oreille		75			62	226	221	302	4,960	67,800	63,888	90,600
Mica	50	650	250	250	138	1,124	1,697	812	41,400	337,220	509,100	243,600
Cataldo	600	7			508	58	274		152,400	17,400	82,200	
West St. Joe	850	275	750	750	716	761	3,060	1,830	214,800	228,300	918,000	549,000
Kendrick	50	5		15	128	43	2,530	850	38,400	12,900	759,000	255,000
C.P.T.P.A.	2,100	260*	3,085*	100	2,010	781*	6,297*	1,531	603,000	234,300*	1,888,800*	459,300
Craig Mtns.	600	268	700	10	656	265	1,285	381	196,800	79,500	385,500	114,300
Maggie Creek	1,751				450			76	135,000			22,800
TOTALS	6,001	1,540	4,785	1,125	4,677	3,265	15,376	5,957	1,386,760	979,520	4,607,448	1,787,100

*Includes Maggie Creek District.

SUMMARY OF INFESTED ACRES AND/OR TREES
BY STATE FOREST PROTECTIVE DISTRICT

WESTERN PINE BEETLE

DISTRICT	ACRES				TREES				VOLUME (fbm)			
	1976	1977	1978	1979	1976	1977	1978	1979	1976	1977	1978	1979
Priest Lake							5	4			2,000	1,600
Pend Oreille	5				8		25	18	3,200		10,000	7,200
Mica					6		17	12	2,400		6,800	4,800
Cataldo					7		3		2,800		1,200	
West St. Joe					12		21	14	4,800		8,400	5,600
Kendrick					2		7	6	800		2,800	2,400
C.P.T.P.A.					17*		12*	20	6,800*		4,800*	8,000
Craig Mtns.	20			10	38	1	10	16	15,200		4,000	6,400
Maggie Creek								5				2,000
TOTALS	25			10	90	1	100	95	36,000		40,000	38,000

*Includes Maggie Creek District

SUMMARY OF INFESTED ACRES AND/OR TREES
BY STATE FOREST PROTECTIVE DISTRICT

DOUGLAS-FIR BEETLE

DISTRICT	ACRES				TREES				VOLUME (fbm)			
	1976	1977	1978	1979	1976	1977	1978	1979	1976	1977	1978	1979
Priest Lake	20	2			66	16	4	40	26,400	6,400	1,600	16,000
Pend Oreille	25	5			35	23	218		14,000	9,200	87,200	
Mica					3		305	10	1,200		122,000	4,000
Cataldo	1				27		65		10,800		26,000	
West St. Joe		10			100	91	92		40,000	36,400	36,800	
Kendrick		5			35	56	21		14,000	22,400	8,400	
C.P.T.P.A.	300*	157*			1,880*	940*	1,049*	199	676,800*	282,000*	419,600*	79,600
Craig Mtns.	50			35	38		462	418	15,200		184,800	167,200
Maggie Creek								35				14,000
TOTALS	396	179		35	2,184	1,126	2,216	702	798,400	356,400	886,400	280,800

*Includes Maggie Creek District.

SUMMARY OF INFESTED ACRES AND/OR TREES
BY STATE FOREST PROTECTIVE DISTRICT

PINE ENGRAVER

DISTRICT	ACRES				TREES				VOLUME (fbm)			
	1976	1977	1978	1979	1976	1977	1978	1979	1976	1977	1978	1979
Priest Lake						4	248	10				
Pend Oreille			1,000	750	25	23	4,538	1,072				
Mica	10	175	1,125		65	608	7,325	870				
Cataldo		10				83	135					
West St. Joe		910	1,000	100	10	1,113	5,099	275				
Kendrick		7		5		74	1,107	176				
C.P.T.P.A.		100*	238*		18*	611*	2,040*	15				
Craig Mtns.	45	225		10	87	941	2,824	143				
Maggie Creek								5				
TOTALS	55	1,427	3,363	865	205	3,457	23,316	2,566				

*Includes Maggie Creek District.

SUMMARY OF INFESTED ACRES AND/OR TREES
BY STATE FOREST PROTECTIVE DISTRICT

MOUNTAIN PINE BEETLE - LODGEPOLE PINE

DISTRICT	ACRES				TREES				VOLUME (fbm)			
	1976	1977	1978	1979	1976	1977	1978	1979	1976	1977	1978	1979
Priest Lake												
Pend Oreille												
Mica												
Cataldo												
West St. Joe												
Kendrick												
C.P.T.P.A.						25*	25*				2,125*	
Craig Mtns.	10	2,647	2,520	3,500	20	2,650	10,210	10,321			867,850	877,285
Maggie Creek												
TOTALS	10	2,647	2,520	3,500	20	2,675	10,235	10,321			869,975	877,285

*Includes Maggie Creek District.

SUMMARY OF INFESTED ACRES AND/OR TREES
BY STATE FOREST PROTECTIVE DISTRICT

MOUNTAIN PINE BEETLE - PONDEROSA PINE

DISTRICT	ACRES				TREES				VOLUME (fbm)			
	1976	1977	1978	1979	1976	1977	1978	1979	1976	1977	1978	1979
Priest Lake												
Pend Oreille					4				200			
Mica							11				550	
Cataldo												
West St. Joe							10				500	
Kendrick												
C.P.T.P.A.						1*						
Craig Mtns.	1				5			2	2,000			100
Maggie Creek												
TOTALS	1				9	1	21	2	2,200		1,050	100

*Includes Maggie Creek District.

SUMMARY OF INFESTED ACRES AND/OR TREES
BY STATE FOREST PROTECTIVE DISTRICT

MOUNTAIN PINE BEETLE - WESTERN WHITE PINE

DISTRICT	ACRES				TREES				VOLUME (fbm)			
	1976	1977	1978	1979	1976	1977	1978	1979	1976	1977	1978	1979
Priest Lake					10							
Pend Oreille												
Mica												
Cataldo												
West St. Joe												
Kendrick												
C.P.T.P.A.						9*	25*				10,000*	
Craig Mtns.												
Maggie Creek												
TOTALS						9	25				10,000	

*Includes Maggie Creek District

SUMMARY OF INFESTED ACRES
BY STATE FOREST PROTECTIVE DISTRICT

LARCH CASEBEARER

Moderate to Heavy Defoliation Only

DISTRICT	ACRES 1976	1977	1978	1979
Priest Lake	75	425	450	11,618
Pend Oreille	2,100	3,030	1,300	26,394
Mica	1,300	2,275	2,465	15,034
Cataldo	30		325	
West St. Joe	500	1,000	1,539	3,350
Kendrick	50	4,412	700	3,030
C.P.T.P.A.	1,185*	2,195*	3,085*	2,100
Craig Mtns.			25	560
Maggie Creek				250
TOTALS	5,240	13,337	9,889	62,336

*Includes Maggie Creek District.

DOUGLAS-FIR BEETLE
MOUNTAIN PINE BEETLE
WHITE PINE BLISTER RUST
PINE ENGRAVER BEETLE

1979

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF IDAHO

Scale 1:1,000,000
1 inch equals approximately 16 miles

Datum is mean sea level

Compiled, edited, and published by the Geological Survey
1927 North American datum
Lambert conformal conic projection based on standard parallels 33° and 45°

BASE MAP

SOURCE DATA

POPULATION KEY
BOISE
TWIN FALLS
Kellogg
Shoshone

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
COMPILED IN 1968
EDITION OF 1968

DOUGLAS-FIR BEETLE
MOUNTAIN PINE BEETLE
WHITE PINE BLISTER RUST
PINE ENGRAVER BEETLE

1978

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF IDAHO

Scale 1:1,000,000
1 inch equals approximately 16 miles

FOR SALE BY U S GEOLOGICAL SURVEY DENVER COLORADO 80225 OR WASHINGTON D C 20242
COMPILED IN 1968
EDITION OF 1968

FIR ENGRAVER BEETLE
WESTERN SPRUCE BUDWORM
LARCH PROBLEMS

1979

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF IDAHO

Scale 1:1,000,000
1 inch equals approximately 16 miles

Datum is mean sea level

Compiled, printed, and published by the Geological Survey, 1927 north American datum
Lambert conformal conic projection based on standard parallels 33° and 45°

LEGEND

- State capital
- County seat
- City, town, village, or locality
- Scheduled service airport
- Built-up area shown for towns over 5,000 population

SOURCE DATA

U. S. Dept. of the Interior Geological Survey, topographic maps
U. S. Dept. of the Army Corps of Engineers topographic maps

BASE MAP

POPULATION KEY

BOISE	over than 25,000
TWIN FALLS	10,000 to 25,000
Kellogg	2,500 to 10,000
Grangeville	1,000 to 2,500
Nezperce	less than 1,000

Population indicated by size of letters

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
COMPILED IN 1969
EDITION OF 1969

FIR ENGRAVER BEETLE
WESTERN SPRUCE BUDWORM
LARCH PROBLEMS

1978

CANADA

WASHINGTON

OREGON

NEVADA

UTAH

WYOMING

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF IDAHO